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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,075	07/02/2003	Hardayal Singh Gill	HIT1P019/HSJ9-2003-0105US	6398

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EXAMINER

OMETZ, DAVID LOUIS

ART UNIT	PAPER NUMBER
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2653

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/614,075	Applicant(s) GILL, HARDAYAL SINGH	
	Examiner David L. Ometz	Art Unit 2653	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6,9-18 and 21-25 is/are rejected.
- 7) ☒ Claim(s) 7,8,19 and 20 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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1. Figures 1A-2B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. Claim 14 is objected to because of the following informalities: in line 11, --the-- should be inserted before "free". Appropriate correction is required.
3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 9, 10, 13, 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Dill et al (US Pat 6023395). Dill et al shows a magnetic head in figure 4A having:

As per claim 1, a magnetic head having an air bearing surface (ABS), comprising: an antiparallel (AP) pinned layer structure 118 (see col. 9, lines 65 *et seq.*); a bias layer 150 spaced apart from the AP pinned layer structure, a magnetic moment of the bias layer being pinned 151; and a free layer 132 positioned between the AP pinned layer structure 118 and the bias layer 150; wherein the bias layer provides magnetic stability to the free layer 132.

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As per claim 9, a head as recited in claim 1, wherein a magnetic moment of the bias layer is oriented antiparallel to the magnetic moment of the free layer.

As per claim 10, a head as recited in claim 1, wherein the head forms part of a GMR head.

As per claim 13, a head as recited in claim 1, wherein the head forms part of a tunnel valve sensor.

As per claim 25, a magnetic storage system (see figs. 1-3), comprising: magnetic media; at least one head for reading from and writing to the magnetic media, each head having: a sensor having the structure recited in claim 1; a write element coupled to the sensor; a slider for supporting the head; and a control unit coupled to the head for controlling operation of the head.

5. Claims 1, 6, 9-13, 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Pinarbasi (US Pat Pub. 2003/0179513). Pinarbasi shows a magnetoresistive head in figure 10 having:

As per claim 1, a magnetic head having an air bearing surface (ABS), comprising: an antiparallel (AP) pinned layer structure 204; a bias layer 244 spaced apart from the AP pinned layer structure, a magnetic moment of the bias layer 244 being pinned; and a free layer 202 positioned between the AP pinned layer structure and the bias layer; wherein the bias layer provides magnetic stability to the free layer.

As per claim 6, a head as recited in claim 1, wherein a magnetic thickness of the bias layer (30 Angstroms) is about the same as a magnetic thickness of the free layer ($15+15 = 30$ Angstroms) for creating a flux closed structure.

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As per claim 9, a head as recited in claim 1, wherein a magnetic moment of the bias layer is oriented antiparallel to the magnetic Moment of the free layer.

As per claim 10, a head as recited in claim 1, wherein the head forms part of a GMR head.

As per claim 11, a head as recited in claim 1, wherein the head forms part of a CPP GMR sensor.

As per claim 12, a head as recited in claim 1, wherein the head forms part of a UP GMR sensor.

As per claim 13, a head as recited in claim 1, wherein the head forms part of a tunnel valve sensor.

As per claim 25, a magnetic storage system (see figs 1-6), comprising: magnetic media; at least one head for reading from and writing to the magnetic media, each head having: a sensor having the structure recited in claim 1; a write element coupled to the sensor; a slider for supporting the head; and a control unit coupled to the head for controlling operation of the head.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 14, 18, 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dill et al in view of Coffey et al (US Pat 5583725). Dill et al shows a magnetoresistive head

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with an in-stack biasing layer as noted above. However, Dill et al does not show wherein the AP pinned layer structure includes at least two pinned layers having magnetic moments that are self-pinned antiparallel to each other. Coffey et al shows a magnetoresistive head in figure 5 that has the AP pinned layer 70 self-pinned. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to self-pin the pinned layer of Dill et al as doing this would eliminate the need for an antiferromagnetic pinning layer, therefore simplifying the structure and decreasing the height of the MR sensor by eliminating a layer (see abstract of Coffey et al).

8. Claims 3, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dill et al in view of Coffey et al as applied to claims 2, 14, 18, 21-24 above, and further in view of Fujikata et al (US Pat 6051309). Dill et al shows a magnetoresistive head with an in-stack biasing layer as noted above. However, Dill et al does not show wherein a thickness of the AP coupling layer and thicknesses of the pinned layers are selected to provide a saturation field above about 10 KOe. Fujikata et al discloses a magnetoresistive head with a pinned layer saturation field of greater than 10 kOe (see fig. 5). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the pinned layer of Dill et al have a saturation field of greater than 10kOe as doing this would improve the stability of the MR head as taught by Fujikata, col. 9, lines 38-48.

9. Claims 4, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dill et al in view of Coffey et al as applied to claims 2, 14, 18, 21-24 above, and further in view of Pinarbasi (US Pat 6295187).). Dill et al shows a magnetoresistive head with an in-stack biasing layer as noted above and further shows the AP pinned layer structure having a magnetic anisotropy

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oriented perpendicular to an ABS of the reading head. However, Dill et al does not show wherein the AP pinned layer structure has a positive magnetostriction. Pinarbasi discloses a magnetoresistive head with a pinned layer having high positive magnetostriction (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the magnetostriction of the pinned layer of Dill et al positive as taught by Pinarbasi so as to stabilize the pinning of the pinned layer as taught in the abstract of Pinarbasi.

10. Claims 5, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dill et al in view of Coffey et al as applied to claims 2, 14, 18, 21-24 above, and further in view of Terunuma (US Pat 6545848).). Dill et al shows a magnetoresistive head with an in-stack biasing layer as noted above in addition to wherein a magnetic moment of the bias layer is pinned parallel to a track width of the reading head. However, Dill et al does not show wherein the bias layer has a negative magnetostriction. Terunuma discloses a magnetoresistive head with a bias layer having negative magnetostriction (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the magnetostriction of the bias layer of Dill et al negative as taught by Terunuma so as to suppress increase in hysteresis in a change of the magnetization of the bias ferromagnetic film to an external magnetic film (see abstract of Terunuma).

11. Claims 7, 8, 19, 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references cited all show magnetoresistive heads with in-stack biasing of the free layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Ometz whose telephone number is (703) 308-1296.

The examiner can normally be reached on M-W, 6:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David L. Ometz
Primary Examiner
Art Unit 2653

DLO
8/9/04